DISCUSSION

This map shows areas of relative suitability for wastewater disposal in properly designed, constructed, and maintained septic-tank soil-absorption (STSA) systems. The map is one of four sheets that cover the western Wasatch County study area (see "Location Map and Index to Sheets" at bottom of map).

Site characteristics critical to the proper functioning of a conventional STSA system include soil type, depth to ground water, depth to bedrock, slope steepness and stability, and flood hazard. The permeability and filtering capacity of a soil depends on its texture (grain-size distribution) and structure (arrangement of particles). Soils with a high clay content seldom possess sufficient permeability to function properly in a STSA system, particularly if the clay minerals are expansive. Such soils may perform satisfactorily for a short time, but insufficient permeability eventually causes system failure as the soil becomes saturated and swells. If soils are too coarse grained and lack fine particles, permeabilities may be too high and filtering capability too low to effectively filter contaminants from the effluent. Under such conditions ground-water contamination is a concern. In areas where ground water is shallow, the potential for ground-water contamination is increased, as is the possibility of system saturation and failure. STSA systems installed in or just above bedrock may lead to the pollution of ground water in rock aquifers with high fracture permeability and low filtering capability, or to system failure in rock with low permeability.

Surface seepage may result when STSA systems are installed on steep slopes, especially where impermeable soil horizons or caliche layers restrict the downward movement of the effluent and force it to migrate laterally to a slope face. STSA systems on potentially unstable slopes can destabilize the slopes by increasing soil moisture. In addition to destroying the STSA system, the resultant slope failure can damage other structures and property. Flooding presents a hazard to STSA systems because associated erosion can damage the system. Also, floodwaters infiltrating the ground may flood the system and cause failure and/or carry fine sand and silt into distribution lines, causing them to plug.

Geologic, hydrologic, and soil conditions in western Wasatch County are variable, and as a result, the suitability for STSA systems varies widely. Large portions of the area are characterized by shallow or exposed bedrock, shallow ground water, and/or slow soil permeability. Other areas are generally suitable for STSA systems or have limiting conditions that are either localized or can be accommodated in system design.

USE OF THIS MAP

The relative STSA suitability consists of four categories: (I) generally suitable, (II) generally suitable but locally unsuitable, (III) generally unsuitable but locally suitable, and (IV) generally unsuitable. The mapped boundaries of the relative-suitability areas should be considered gradational, representing zones of transition rather than distinct boundaries.

The criteria used to define the relative-suitability categories are based on Wasatch City-County Health Department requirements. Site conditions critical in establishing the suitability categories are denoted on the map by qualifiers (a through e) and geologic-hazards designations (F and L) (see map Explanation). These conditions and sources of data include:

- soil percolation rates from U.S. Soil Conservation Service information,
- seasonal ground-water depth from water wells, Wasatch City-County Health Department, and Natural Resources Conservation Service,
- depth to bedrock from Utah Geological Survey (UGS) surficial-geologic maps,
- slope inclination from slope maps generated by the Wasatch County Geographical Information Systems Department,
- flood-hazard areas determined from Federal Emergency Management Agency and Federal Insurance Administration maps and UGS surficial-geologic maps, and
- landslide-hazard areas from UGS surficial-geologic maps.

In general, a suitability designation of "I" indicates that site conditions are favorable for proper functioning of a STSA system, and the risk of system failure due to geologic or hydrologic factors is low. Areas designated as "II," "III," and "IV," respectively, have certain limiting conditions of progressively greater extent. For example, a map area designated as "IIa" indicates that site conditions should be favorable over most of the area, but slow percolation rates should be expected locally. In contrast, a map area designated as "IIIa" indicates that slow percolation rates should be expected over most of the area, and favorable conditions should exist only locally. Extensive investigation may be required to locate acceptable STSA-system sites within areas of suitability category "III." Within areas of suitability category "IV," unfavorable site conditions should be expected over the entire area, and alternative methods of wastewater disposal, such as sewers, will likely be necessary.

This map is intended to be used as a tool for highlighting possible geologic and hydrologic conditions that might affect the performance of proposed STSA systems. It will be most effective if used to guide planning decisions regarding the suitability of particular areas for conventional STSA systems or alternative methods of wastewater disposal, such as mound systems, pressure-distribution systems, or sewers. The relative suitability for conventional STSA systems is based on geologic conditions expected in an area, and does not reflect considerations such as aquifer recharge areas, proximity to lake shores or streams, and STSA-system density.

The map is at a regional scale and, although it can be used to gain an understanding of the general suitability for STSA systems in a given area, it is not intended to provide information for design of on-site wastewater-disposal systems. Site-specific suitability evaluations performed by qualified professionals (engineering geologists, geotechnical engineers, health department officials) including percolation tests and determination of depth to ground water, depth to bedrock, and topographic slope, are necessary prior to installation of any new STSA system. Additionally, flood and landslide hazards should be evaluated in areas where those hazards are indicated on the map. Plates 1A through 1D (Landslide Hazard) and 2A through 2D (Flood Hazards, Earthquake Hazards, and Problem Soils) of this map folio include discussions of these hazards and recommendations for hazard-evaluation studies. STSA systems may be feasible within some of these hazard areas with proper hazard-reduction measures or site modification.

EXPLANATION

Suitability:

- I Generally suitable
- II Generally suitable but locally unsuitable
- III Generally unsuitable but locally suitable
- IV Generally unsuitable

Qualifiers:

- a Slow percolation rate (greater than 60 minutes per inch)
- b Fast percolation rate (less than 4 minutes per inch)
- c Depth to shallowest expected water table 0-5 feet
- d Depth to bedrock (including tufa in Midway area) 0-5 feet
- e Slope steeper than 25 percent

Geologic Hazards*:

- F Flood (stream, alluvial fan)
- L Landslide (unstable slopes, existing landslide deposits)

* Refer to plates 1A through 1D (Landslide Hazard) and 2A through 2D (Flood Hazards, Earthquake Hazards, and Problem Soils) for discussions of these hazards and recommendations for hazard-evaluation studies.

Examples of suitability with qualifier(s):

- IIb Generally suitable but expect locally unsuitable areas due to fast percolation rates.
- IIIcd Generally unsuitable due to slow percolation rates and/or shallow bedrock; suitable conditions may exist locally.
- IVcF Generally unsuitable due to shallow ground water and/or flood hazard.

SELECTED REFERENCES

Federal Emergency Management Agency, 1983, Flood hazard boundary map, Wasatch County, Utah (unincorporated areas): Federal Emergency Management Agency Map H-01-74, scale 1:24,000.

Federal Insurance Administration, 1980, Flood insurance rate map, town of Charleston, Utah, Wasatch County: U.S. Department of Housing and Urban Development, Community Panel No. 490165 0001 A, scale 1:7,200.

---1980, Flood insurance rate map, city of Midway, Utah, Wasatch County: U.S. Department of Housing and Urban Development, Community Panel No. 490167 0005 B, scale 1:9,600.

---1987, Flood insurance rate map, city of Heber City, Utah, Wasatch County: U.S. Department of Housing and Urban Development, Community Panel No. 490166 0001 B, scale 1:6,000.

Gill, H.E., 1986, Timberlakes Plat 18, *in* Mulvey, W.E., compiler, Technical Reports for 1985, Site Investigation Section: Utah Geological and Mineral Survey Report of Investigation No. 208, p. 197-204.

---1986, Suitability of calcium carbonate deposits near Midway, Utah for installation of individual wastewater disposal systems, *in* Mulvey, W.E., compiler, Technical Reports for 1985, Site Investigation Section: Utah Geological and Mineral Survey Report of Investigation No. 208, p. 215-223.

---1987, Wallsburg Estates Subdivision, *in* Mulvey, W.E., compiler, Technical Reports for 1986, Site Investigation Section: Utah Geological and Mineral Survey Report of Investigation No. 215, p. 100-107.

Gill, H.E., and Lund, W.R., 1985, Investigation of 6 test pits for Wasatch County Health Department; suitability for septic tank drainfields, *in* Harty, K.M., compiler, Technical Reports for 1984, Site Investigation Section: Utah Geological and Mineral Survey Report of Investigation No. 196, p. 206-212.

Hansen, Allen, and Luce, Inc., 1994, Hydrogeologic/water quality study: Salt Lake City, Utah, unpublished consultant's report for Wasatch County, 41 p.

Hylland, M.D., and Lowe, Mike, in preparation, Geology and land-use planning, western Wasatch County, Utah: Utah Geological Survey Special Study.

U.S. Environmental Protection Agency, 1980, Design manual, onsite wastewater treatment and disposal systems: EPA-625/1-80-012, 392 p.

Woodward, Lowell, Jensen, E.H., and Harvey, J.L., 1976, Soil survey of Heber Valley area, Utah - parts of Wasatch and Utah Counties: U.S. Department of Agriculture, Soil Conservation Service and Forest Service in cooperation with Utah Agricultural Research Station, 124 p.

Maps in this folio:

- Landslide Hazard (Plates 1A-1D)
- Flood Hazards, Earthquake Hazards, and Problem Soils (Plates 2A-2D)
- Suitability for Wastewater Disposal in Septic-Tank Soil-Absorption Systems (Plates 3A-3D)

PLATE 3B

SUITABILITY FOR WASTEWATER DISPOSAL IN SEPTIC-TANK SOIL-ABSORPTION SYSTEMS, WESTERN WASATCH COUNTY, UTAH

Michael D. Hylland

1995

Base from Kamas, Francis, and Woodland, Utah, USGS 7.5-minute topographic quadrangle maps. Drafted by Noah P. Snyder